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ENERGY-EFFICIENT ELECTRIC MOTORS

Third Edition, Revised and Expanded

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*Illinois Institute of Technology
Chicago, Illinois*



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To John C. Andreas

Preface

The main purpose of this new edition continues to be to provide guidelines for selecting and utilizing electric motors on the basis of energy efficiency and life-cycle cost. In previous editions of this book, particular emphasis was given to three-phase and single-phase induction motors in the 1–200 hp range since this was the range offering maximum opportunities for energy savings. However, since the second edition, there has been a growing demand in the direction of solid-state intensive electric motor drives as adjustable or variable speed drives. New electric motors such as brushless DC and switched reluctance have also been mass-produced and made commercially available. The impetus toward this expansion of power electronics has been provided by recent advancements in the areas of solid-state switching devices, control electronics, and advanced microcontrollers, microprocessors, and digital signal processors (DSP). These advancements facilitate high-tech applications and enable the introduction of power electronic converters with highest performance, maximum efficiency, and minimum volume and weight. In fact, electric motors with advanced power electronic drivers have real and significant potential for

improving not only efficiency and life-cycle cost, but also reliability, performance, and safety.

In this edition, [Chapters 1, 2, 4, 5, and 7](#) from the previous editions have been updated, rearranged, and revised. These chapters present energy-efficient single-phase and three-phase induction motors comprehensively. [Chapters 3, 6, 8, 9, and 10](#) are new. Chapter 3 presents the fundamentals of power electronics applicable to electric motor drives. Adjustable speed drives and their applications are explained in Chapter 6. Advanced permanent magnet (PM) and brushless DC (BLDC) motor drives as well as switched reluctance motor (SRM) drives are presented in Chapters 8 and 9, respectively. Finally, utility interface issues including power factor correction (PFC) and active filters (AF) are discussed in Chapter 10.

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